

PRESENTED



MYSIDACEA AND EUPHAUSIACEA

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WITH FOURTEEN TEXT-FIGURES.

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MYSIDACEA.

INTRODUCTION.

THE collection of Mysidacea made by the Barrier Reef Expedition comprises twenty-three species. They were all collected in townets used during investigations on the plankton of the Barrier Reef region. No dredging operations were undertaken, and no special attention was paid to the bottom fauna of the area. At one station (Stn. 29) the bottom stramin net actually touched the bottom and collected six species of bottom-living Mysids. The remaining seventeen species are planktonic forms. I have elsewhere analysed the plankton catches as far as the Mysidacea are concerned. A summary of these results may appropriately be given here.

* The occurrence and seasonal distribution of the Mysidacea and Euphausiacea are discussed in a separate report (see Vol. II, No. 8).

The plankton hauls were mainly made in the daylight, but a few night hauls are available for comparison. Mysids form a very insignificant part of the daylight plankton. In no case did the total number of mysids in any haul exceed .4% of the total animals caught in the nets. Mysids were absent from the daytime plankton from October to April, and were most abundant in August and May.

The planktonic mysids from the daylight plankton belong mainly to two species, *Anchialina typica* and *Promysis orientalis*. Six other species occurred in daylight hauls, but only in single specimens very occasionally. These six species were :

Siriella thompsoni.
„ *vulgaris*.
Hemisiriella parva.

Anchialina grossa.
Doxomysis littoralis.
Anisomysis laticauda.

An analysis of the vertical distribution of the two common planktonic species, *Anchialina typica* and *Promysis orientalis*, shows that they exhibit diurnal migrations, rising to the upper waters and even to the surface by night and descending to the deeper waters by daytime.

An examination of the plankton hauls made during hours of darkness presents a very different picture of the mysid population. No fewer than seventeen species of mysids occurred in night hauls. Some of these, notably *Hemisiriella pulchra*, *Pseudanchialina pusilla*, *Doxomysis littoralis* and *Siriella dubia*, occurred in some considerable numbers. These results suggest that most of the mysids of the Barrier Reef region are bottom-living by day and become planktonic by night only.

With regard to the geographical distribution of the Barrier Reef mysids sixteen species were captured by the "Siboga" Expedition in the waters of the Dutch East Indies, and of these eight are also known from the coast of India. The collection, which may be taken to represent the littoral fauna of the Barrier Reef, demonstrates that this fauna is part of a more or less uniform, shallow-water tropical fauna extending from the Indian Ocean to the Western Pacific, and is probably even more generally distributed in the Pacific area.

Two species, *Siriella thompsoni* and *Anchialina typica*, have a distribution which extends outside this area. The former is an oceanic species of world-wide distribution in tropical waters, and apparently invades the shallow water of the lagoon area of the reef under certain exceptional physical conditions. The latter species also is widespread in tropical and subtropical waters of both Pacific and Atlantic oceans. It is a regular planktonic species in the Barrier Reef area from May to October, and there is a suggestion that it migrates inshore during this season of the year for breeding purposes, moving out to deeper water again in the non-breeding season. The same is probably true for *Promysis orientalis* also.

The collection contains four species described as new to science : *Pseudomysidetes russelli*, *Metamblyops stephensoni*, *Erythrops yongei* and *Anisomysis incisa*. One other species is probably new, but the material is too scanty to allow of adequate description.

SYSTEMATIC ACCOUNT.

ORDER MYSIDACEA.

SUB-ORDER MYSIDA.

Family MYSIDAE.

Sub-Family SIRIELLINAE.

Genus *Siriella*, Dana.*Siriella thompsoni* (H. Milne-Edwards).

S. thompsoni, Hansen, 1910.

OCCURRENCE.—Stn. 16, 3 mi. E. of Low Isles, 3.xi.28, coarse townet at 8 m., 1 immature male.

Stn. 27, 3 mi. E. of Low Isles, 21.xi.28, 1 m. stramin net, 1 immature male.

Low Isles Lagoon, 16.xi.28, small coarse net at night, 1 immature.

REMARKS.—An oceanic species which apparently finds its way into the lagoon under certain conditions. Its occurrence in the lagoon coincided with that of certain species of oceanic Euphausians, and no specimens were found in any of the hauls taken later than November.

Siriella nodosa, Hansen.

S. nodosa, Hansen, 1910.

S. nodosa, Colosi, 1918 and 1920.

OCCURRENCE.—Taken on four occasions at the Low Isles anchorage, in night townettings made with the small coarse townet.

REMARKS.—No specimen occurred in hauls made in daylight at any time of the year. The specimens agree very closely with Hansen's description and figures. In immature specimens only the post-cervical protuberance on the dorsal surface of the carapace is present—the pre-cervical one, however, appearing in all adult specimens.

DISTRIBUTION.—East Indies (Hansen, 1910); Torres Straits (Colosi, 1918 and 1920).

Siriella vulgaris, Hansen.

S. vulgaris, Hansen, 1910.

S. vulgaris, Tattersall, 1922.

S. vulgaris, Colosi, 1924.

S. vulgaris, Tattersall, 1928.

OCCURRENCE.—Stn. 2, 3 mi. E. of Low Isles: 30.vii.28, 1 m. stramin net, 1, immature.

Stn. 63, 24.vi.29, coarse net, 1, immature.

Low Isles Anchorage and Low Isles Flat: Taken on six occasions in night townettings, 20 specimens in all, including adult males and females and immature specimens.

REMARKS.—It is significant that this species occurred mainly in night townettings.

DISTRIBUTION.—East Indies (Hansen, 1910); India (Tattersall, 1922); Arabian Sea (Colosi, 1924); Queensland (Tattersall, 1928).

Siriella inornata, Hansen.

S. inornata, Hansen, 1910.

S. inornata, Tattersall, 1928.

OCCURRENCE.—Taken on six occasions in night townetings at the Low Isles Anchorage and over the Low Isles Flat.

REMARKS.—Twenty-three specimens occurred in the collections in all. Adult males and females occurred in May and June, and measured 12 mm. The females were carrying eggs in June. The specimens caught in October and November were immature, measuring only 5–6 mm. It is interesting that the species only occurred in night townetings.

DISTRIBUTION.—Known only from the East Indies (Hansen, 1910) and Queensland (Tattersall, 1928).

Siriella anomala, H. J. Hansen.

S. anomala, Hansen, 1910.

OCCURRENCE.—Low Isles Anchorage, 28.vi.29, small coarse net at night, 1 male, 10 mm.

REMARKS.—The specimen agrees well with Hansen's description.

DISTRIBUTION.—Known previously only from the Siboga collections from the East Indies.

Siriella dubia, Hansen. (Text-fig. 1.)

S. dubia, Hansen, 1910.

S. dubia, Tattersall, 1922.

OCCURRENCE.—Stn. 65, 3 mi. E. of Low Isles, 10.vii.29. Coarse silk townet: Surface, 12 specimens; 3–7 m., 3 specimens; 8 m., 9 specimens; 12.5 m., 1 specimen.

REMARKS.—These specimens confirm my earlier observations (1922) that in this species there are three small equal spines at the apex of the telson between the inner pair of large spines, in addition to the usual pair of plumose setae. *S. dubia* thus conforms to the usual type of telson found in other species of the genus, and Hansen's type-specimen must be regarded as abnormal in this particular. The species is, however, quite peculiar in having the proximal joint of the outer uropods armed with *both* spines and setae on its outer margin. The serrations noted by Hansen on this margin represent the bases of broken-off setae and not spines. Several of the specimens in this collection have the setae intact, and thus confirm my previous observations on this point (1922).

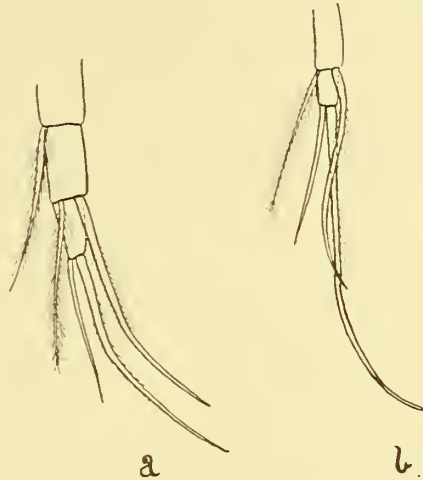
Both the third and fourth pleopods of the male have the endopod modified at the extremity. No other species of the genus to my knowledge has both these pleopods modified. I give herewith (Text-fig. 1) figures of the extremities of the endopod of both third and fourth pleopods of the male to illustrate this feature, and also to correct my previous account of the fourth pleopod of the male (1922).

The terminal joint of the endopod of both pleopods bears two modified setae, one very much longer than the other.

The penultimate joint bears one modified seta, slightly curved in the third pleopod, and more curved in the fourth. The long modified setae of the third pleopod are more or less equal in length, but on the fourth pleopod that of the terminal joint is considerably

longer than that of the penultimate joint. The long stout setae are apparently finely feathered, the shorter terminal setae being simple.

DISTRIBUTION.—East Indies (Hansen, 1910); India (Tattersall, 1922).



TEXT-FIG. 1.—*Siriella dubia*, Hansen. *a*, Terminal portion of the endopod of the third pleopod of the male; *b*, terminal portion of the endopod of the fourth pleopod of the male. Both $\times 112$.

Genus *Hemisiriella*, Hansen.

Hemisiriella pulchra, Hansen.

H. pulchra, Hansen, 1910.

OCCURRENCE.—Stn. 21, 3 mi. E. of Low Isles, 22.x.28, 1 m. stramin net at night, 1 female and 2 immature specimens.

Stn. 65, 3 mi. E. of Low Isles, 10.vii.29, series of townetings at night, abundant, especially in the upper layers of water.

DISTRIBUTION.—Hitherto only known from Hansen's original locality in the East Indies.

Hemisiriella parva, Hansen.

H. parva, Hansen, 1910.

H. parva, Colosi, 1918 and 1920.

H. parva, Zimmer, 1918.

H. parva, Tattersall, 1922.

OCCURRENCE.—Stn. 1, 3 mi. E. of Low Isles, 27.vii.28, coarse townet, 1 immature female.

DISTRIBUTION.—East Indies (Hansen, 1910); Indian Ocean (Colosi, 1918 and 1920); Java (Zimmer, 1918); Andaman Islands (Tattersall, 1922).

Sub-Family RHOPALOPHTHALMINAE.

Genus *Rhopalophthalmus*, Illig.

Rhopalophthalmus egregius, Hansen.

R. egregius, Hansen, 1910.

R. egregius, Nakazawa, 1910.

R. egregius, Tattersall, 1915, 1921, 1922.

R. egregius, Colosi, 1918, 1920.

OCCURRENCE.—Stn. 29, outside Trinity Opening, 24.xi.28, bottom stramin net, 1 very young specimen.

REMARKS.—The single specimen is very small and immature, but appears to belong to this species. The only difference of note between the specimen and Hansen's description and figures is that the apex of the rostrum is slightly emarginate. This is possibly a character of immaturity.

DISTRIBUTION.—Widely distributed in shallow waters of the Pacific Ocean from India to Japan, including a record by Colosi from between New Caledonia and New Zealand.

Sub-Family GASTROSACCINAE.

Genus *Anchialina*, Norman.

Anchialina typica (Kröyer).

A. typica, Hansen, 1910, 1912.

A. typica, Colosi, 1918, 1920.

A. typica, Tattersall, 1922, 1923, 1926.

OCCURRENCE.—One of the most characteristic species of the Barrier Reef Lagoon. It occurred in small numbers at the weekly plankton station, 3 mi. E. of Low Isles, in the summer and autumn months, but was apparently absent between October and May.

REMARKS.—These specimens show one point of difference from the account given by Hansen. The corner of the basal joint of the male pleopods is setose and not smooth. There are three setae, one long and plumose, one long and simple, and one short. In all other respects they agree with *A. typica* as redescribed by Hansen.

Anchialina grossa, Hansen.

A. grossa, Hansen, 1910, 1912.

A. grossa, Tattersall, 1922.

A. frontalis, Zimmer, 1915.

OCCURRENCE.—Low Isles Anchorage, 28.vi.29, small coarse townet at night, 1 immature female.

Stn. 67, 3 mi. E. of Low Isles, 17.vii.29, stramin net, 1 immature female.

DISTRIBUTION.—East Indies, Bay of Bengal, Gulf of Siam (Hansen, 1910); Gilbert Islands (Hansen, 1912); between Ceylon and New Guinea (Zimmer, 1915); Andaman Isles (Tattersall, 1922).

Genus *Gastrosaccus*, Norman.

Gastrosaccus, sp. ?.

OCCURRENCE.—Low Isles Anchorage, 29.xi.28, coarse townet at surface, moonlight, 1 very small specimen.

Low Isles Flat, 23.v.29, small coarse townet at night, 3 immature specimens.

Low Isles Flat, 7.vi.29, 1 small specimen.

Stn. 65, 3 mi. E. of Low Isles, coarse silk townet at surface at night, 2 small specimens.

REMARKS.—All the specimens are immature and there are no males. It is, therefore, impossible to identify them with any certainty. The characters of the rostrum and

telson suggest that they belong to *G. indicus*, Hansen, rather than to *G. parva*, Hansen, two species known from the Siboga collections, and likely to occur in the Barrier Reef region. The telson has 9–10 spines on the lateral margins, and the rostrum is practically absent—points in which the specimens resemble *G. indicus*. All the specimens were captured in night townetings.

Genus *Pseudanchialina*, Hansen.

Pseudanchialina pusilla (G. O. Sars).

Anchialus pusillus, G. O. Sars, 1885.

Pseudanchialina pusilla, Hansen, 1910.

OCCURRENCE.—Low Isles Flats, 16.xi.28, 20 specimens.

Low Isles Anchorage, 29.xi.28, coarse townet at surface, moonlight, about 50 specimens, adults of both sexes, the females carrying eggs.

REMARKS.—I was unable to make out the lateral free wings on the first abdominal somite of the female. Hansen likewise could not detect them in his specimens. In all other respects my specimens agree with Hansen's re-description of Sars's species.

DISTRIBUTION.—Celebes Sea (Sars, 1885); East Indies (Hansen, 1910); Bay of Bengal (Hansen, 1910).

Sub-Family MYSINAE.

Tribe ERYTHROPINI.

Genus *Erythrops*, G. O. Sars.

Erythrops yongei, sp. nov. (Text-fig. 2.)

OCCURRENCE.—Stn. 50, outside Papuan Pass, 18.iii.29, 1 m. stramin net, 400 m. to surface, 1 female, 5 mm.

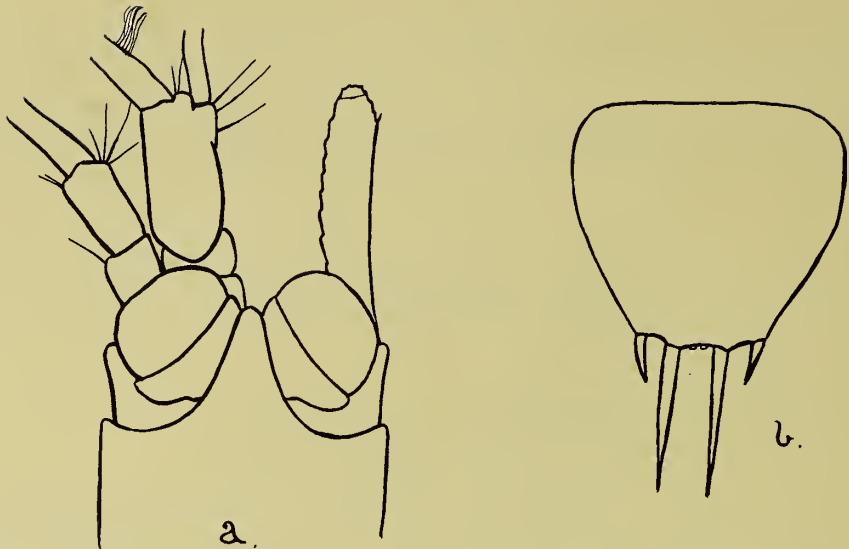
DESCRIPTION.—*Carapace* (Text-fig. 2a) produced in front into a moderately long obtuse rostral plate extending forwards almost to the distal margins of the eyes.

Eyes (Text-fig. 2a) not depressed or kidney-shaped, rather small, subglobose in shape, pigment black.

Antennal scale (Text-fig. 2a) extending forward to the level of the distal end of the antennular peduncle, rather narrow, about five times as long as broad, outer margin terminating in a spine beyond which the apex of the scale extends for a short distance, a small distal joint marked off by a distinct suture.

Telson (Text-fig. 2b) of the typical shape for the genus, about as long as broad at the base; apex armed with two pairs of spines, the inner pair about four times as long as the outer pair, the pair of plumose setae between the inner spines broken, so that it is not possible to estimate their length.

REMARKS.—This species is a typical member of the genus *Erythrops*, but appears to differ from other described forms (1) in the character of the rostral plate and (2) in the small eyes, which are not depressed and kidney-shaped. The characters of the antennal scale and telson will also help to identify it, the apical spines of the latter being less robust in form than is usual in other species.



TEXT-FIG. 2.—*Erythrops yongei*, sp. nov. *a*, Anterior end to show rostral plate, eyes, and antennal scale, $\times 56$; *b*, telson, $\times 112$.

Genus *Hypererythrops*, Holt and Tattersall.

Hypererythrops spinifera (Hansen).

Erythrops spinifera, Hansen, 1910.

Hypererythrops spinifera, Tattersall, 1922.

OCCURRENCE.—Stn. 29, outside Trinity Opening, 24.xi.28, 200 fms., bottom stramin net, 8 males and 6 females, all adult.

Stn. 65, Reef Lagoon, 10.vii.29, coarse townet at 20.7 m., 2 damaged specimens.

REMARKS.—The material of this species is in very poor condition but, as far as can be seen, the specimens agree very closely with those which I examined from India. The telson has both plumose setae and a pair of minute spines between the large pair of apical spines, exactly as I have described in the India material. The rostrum appears to be more pointed than in the specimens I had previously examined, and the antero-lateral angles of the carapace are acute.

DISTRIBUTION.—East Indies (Hansen, 1910); Andaman Isles (Tattersall, 1922).

Genus *Synerythrops*, Hansen.

Synerythrops intermedia, Hansen ?. (Text-fig. 3.)

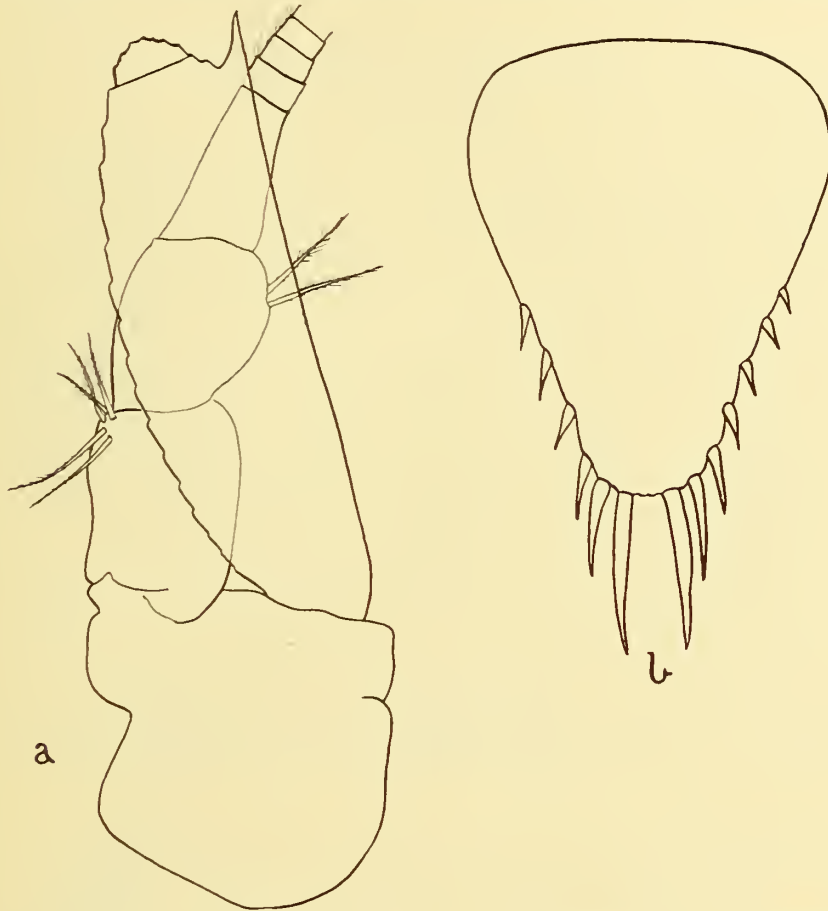
S. intermedia, Hansen, 1910.

OCCURRENCE.—Stn. 29, outside Trinity Opening, 24.xi.28, bottom stramin net, 1 adult male, 1 immature male, and 2 females, 5–7 mm.

REMARKS.—The specimens are in a poor state of preservation. They differ from the description and figures given by Hansen in two respects. Firstly, the eyes appear to me to be slightly depressed and to have the kidney-shape characteristic of *Erythrops*. Hansen describes the eyes of *S. intermedia* as not depressed and subglobose in shape. Secondly, Hansen's figure of the telson shows the spines arming the margins to be confined to the distal quarter of the margins. In the present specimens the spines extend over at least

the distal half of the margins and are slightly more numerous, six to seven on each side, as against five in Hansen's specimens.

Otherwise the material agrees rather closely with the description and figures given by Hansen. I refer it provisionally to his species, and give figures (Text-figs. 3a and 3b) of



TEXT-FIG. 3.—*Synerythrops intermedia*, Hansen. a, Antennal scale, $\times 94$; b, telson, $\times 94$.

the antennal scale and telson of one of my specimens. I may add that the pleopods of the male conform to the type found in the genus *Erythrops*, and that the statocyst of the inner uropods has two spines on the lower inner corner.

DISTRIBUTION.—Known hitherto only from the waters of the Dutch East Indies, where it was collected by the "Siboga" Expedition.

Genus *Katerythrops*, Holt and Tattersall.

Katerythrops sp. ?.

OCCURRENCE.—Stn. 29, outside Trinity Opening, 24.xi.28, bottom stramin net, 1 specimen, 4 mm.

REMARKS.—The specimen is too damaged to admit of identification and description. It has the short and broad telson characteristic of *K. parva*, Zimmer, and *K. tattersalli*, Illig, rather than the more elongate and narrow form of telson found in *K. oceanae*, H.

& T. I can detect traces of only four spines at the apex of the telson—a feature in which the specimen resembles *K. tattersalli*—but the antennal scale is shorter than in the latter species, extending forwards only to the level of the distal end of the antennular peduncle. None of the thoracic limbs remain on the specimen.

Genus *Metamblyops*, Tattersall.

Metamblyops stephensoni, sp. nov. (Text-fig. 4.)

OCCURRENCE.—Stn. 29, outside Trinity Opening, 24.xi.28, bottom stramin net, 11 males, 9 females and 2 immature specimens, 7 mm.

DESCRIPTION.—The material is in very poor condition. None of the thoracic limbs posterior to the second pair remain on any of the specimens. The mouth-parts and the first and second thoracic limbs (Text-figs. 4c and 4d) are typically of the *Erythropops* form, and present no features of special interest. The pleopods of the male also conform to the type found in the same genus, the first pair with a normal exopod and small endopod, the remaining pairs with well-developed exopods and endopods of equal length and without any modified setae or spines on any of the series. The genus *Metamblyops* is distinguished from the remaining genera of the Erythropini (1) in having the eye normal in form, subglobose and not depressed, without finger-like processes of any kind, and with normal pigment, and (2) in the form of the telson, which is lanceolate or linguiform in shape without an apical cleft, the margins armed with more or fewer spines, apical plumose setae absent. The present material agrees with *Metamblyops* in both these characters. It may be distinguished from the only other species of the genus, *M. oculata* (Tattersall, 1911), by the characters of the rostral plate, antennal scale and the telson.

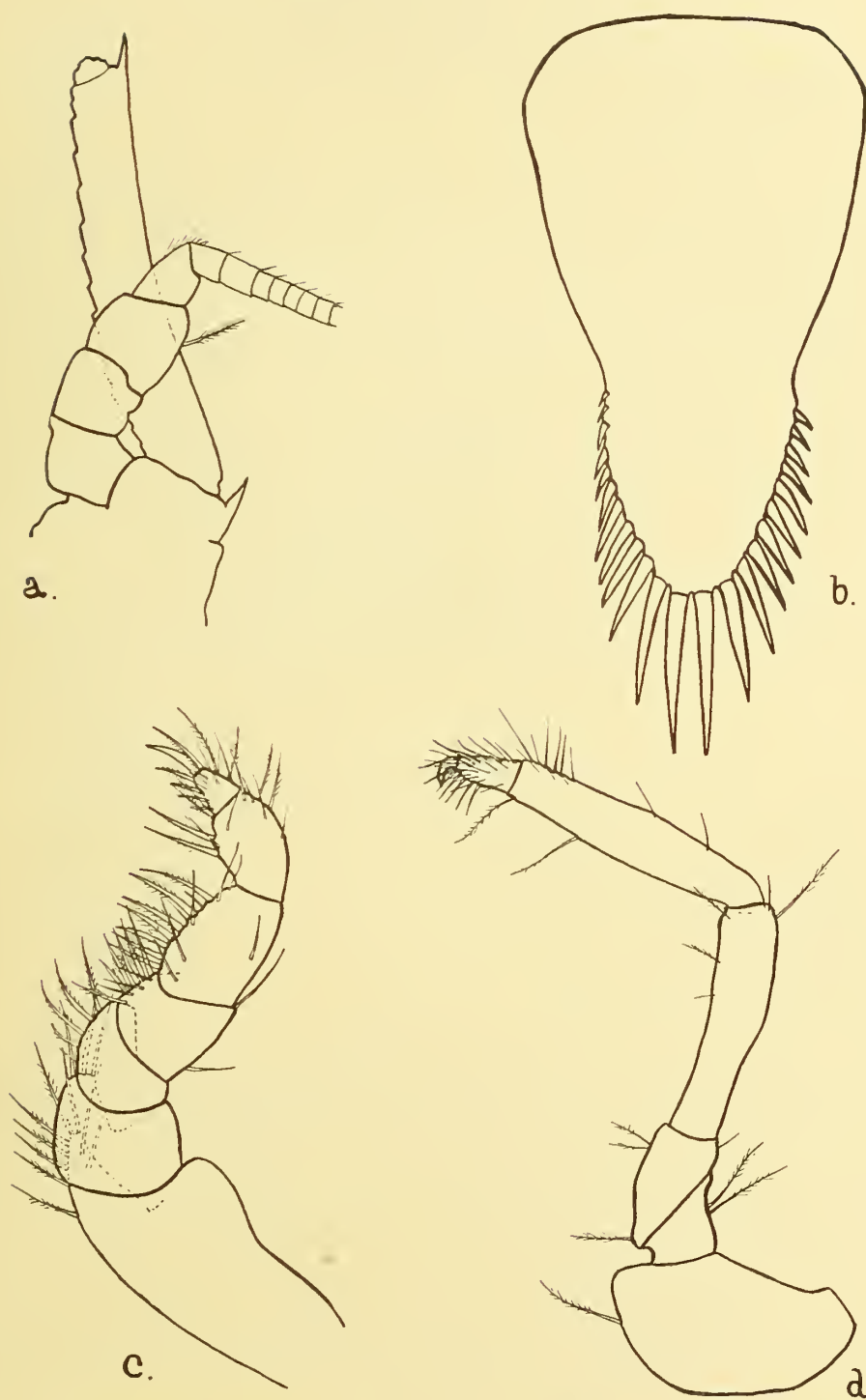
The carapace is broadly arcuate and rounded in front, and not produced into a rostral plate.

The antennal scale (Text-fig. 4a) is rather long and narrow, about seven times as long as broad, outer margin entire and terminating in a strong spine, which projects beyond the apex of the scale. There is a distinct terminal joint marked off by a suture.

The telson (Text-fig. 4b) is triangular in shape, not quite twice as long as broad at the base, and narrowing to a bluntly rounded apex. The distal third of the margins is armed by a series of eleven stout spines, gradually increasing in length to the apex, the pair of spines at the apex about one-third of the length of the entire telson. Proximal to the spines the telson narrows somewhat, and there is no trace of apical plumose setae. The inner uropod has two spines on the statocyst.

M. stephensoni differs from *M. oculata* in three main points: Firstly the rostral plate is virtually absent, whereas in *M. oculata* the rostral plate is long, acutely pointed and extends forwards beyond the eyes. Secondly, the antennal scale is shorter and narrower than in *M. oculata*, where it is only three and a half times as long as broad, and extends for one-third of its length beyond the antennular peduncle. Thirdly, the telson is armed with many fewer but much stouter spines. In *M. oculata* the lateral margins of the telson are armed with about thirty spines.

M. oculata is known only from deep water off the west of Ireland. The occurrence of a second species of the genus in deep water off Australia is therefore a matter of interest from the point of view of geographical distribution.



TEXT-FIG. 4.—*Metamblyops stephensoni*, sp. nov. *a*, Antennal scale, $\times 56$; *b*, telson, $\times 112$; *c*, endopod of the first thoracic limb, $\times 94$; *d*, endopod of the second thoracic limb, $\times 64$.

TRIBE LEPTOMYSINI.

Genus *Doxomysis*, Hansen.*Doxomysis littoralis*, Tattersall.*D. littoralis*, Tattersall, 1922.

OCCURRENCE.—Stn. 59, 3 mi. E. of Low Isles, 31.v.29, 1 m. stramin net, 1 female.

Low Isles Anchorage, 28.vi.29, small coarse townet at night, 1 female.

Stn. 65, 3 mi. E. of Low Isles, coarse silk townet at night, 18 specimens.

REMARKS.—I can find no valid characters to separate the Barrier Reef specimens from *D. littoralis*. Some of the specimens appear to be faintly spinulose, but the material is not well preserved, and I cannot be sure of this character. When describing *D. littoralis* I noticed some specimens which had the body covered by minute spinules, and thought that perhaps they represented an undescribed species. The occurrence at the Barrier Reef of specimens which are apparently smooth and others which are faintly spinulose suggests that the spinules may be rubbed off to varying degrees in the process of collection, and cannot be relied upon as a specific character for this reason. It would seem from these observations that *D. littoralis* is really a faintly spinulose form, and that smooth specimens represent those which have been more or less damaged by collection.

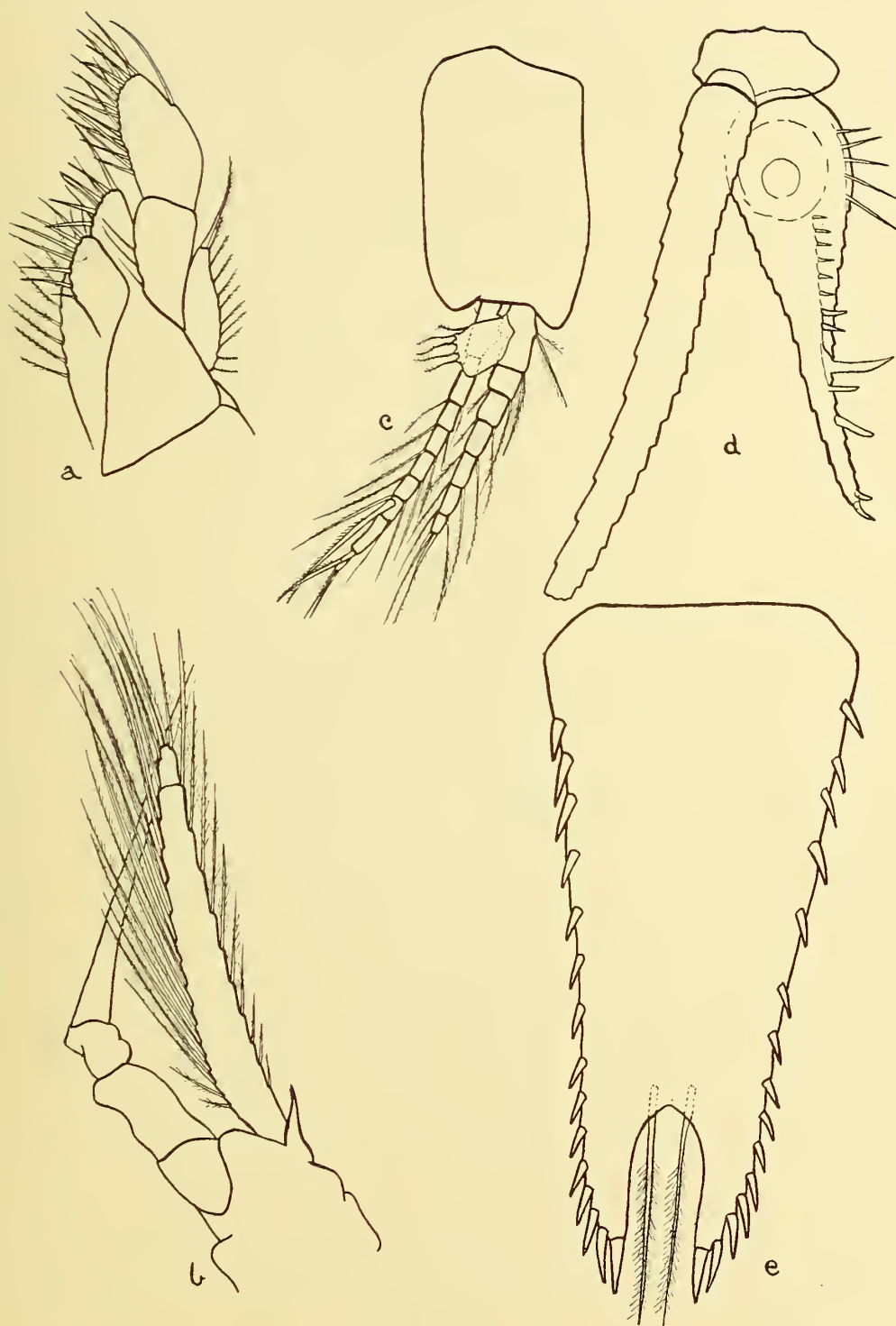
DISTRIBUTION.—Known hitherto only from Port Blair, Andaman Islands (Tattersall, 1922).

Genus *Promysis*, Dana.*Promysis orientalis*, Dana. (Text-fig. 5.)*Promysis orientalis*, Dana, 1852.*P. orientalis*, Czerniavsky, 1883.*Uromysis armata*, Hansen, 1910.*U. armata*, Zimmer, 1915.*U. armata*, Colosi, 1918 and 1920.*Promysis armata*, Tattersall, 1922.

OCCURRENCE.—With *Anchialina typica*, one of the most abundant and characteristic Mysids of the Barrier Reef Lagoon. It occurred in considerable numbers at the weekly plankton station, 3 mi. E. of Low Isles in both day and night townettings, in the summer and autumn months, but appeared to be absent or very scarce between September and May.

REMARKS.—The most important difference between these specimens and Hansen's description and figures is the presence of a pair of plumose setae at the base of the cleft of the telson (Text-fig. 5e). These setae are to be found in all my specimens. Hansen states that such setae are absent in his specimens, but Zimmer (1915) notes their presence in the specimens examined by him. I can only conclude that they had been accidentally broken off in the specimens recorded by Hansen.

Other minor differences are to be found between these specimens and the description and figures of Hansen. The second maxilla has eleven setae on the margin of the exopod (Text-fig. 5a), whereas Hansen figures only three. The telson (Text-fig. 5e) has about fifteen spines on the lateral margins—rather more than in Hansen's specimens. These differences are readily attributable to differences in size. Hansen gives the size of adult



TEXT-FIG. 5.—*Promysis orientalis*, Dana. *a*, Maxilla, $\times 56$; *b*, antennal scale, $\times 56$; *c*, fourth pleopod of the male, $\times 56$; *d*, uropods, $\times 56$; *e*, telson, $\times 112$.

specimens as 4 mm. for the male and 3.5 mm. for the female. My largest specimens are between 6 and 7 mm. in length. Hansen's figures for the mouth-parts of the species are taken from immature specimens.

The examination of these specimens raises once more the question as to the identity of Hansen's species with the earlier *P. orientalis*, Dana. In 1923, when pointing out that the genus *Uromysis*, Hansen, was certainly the same as *Promysis*, Dana, I hinted at the specific identity of Hansen's and Dana's species. One important difference between them, that of size, disappears in the light of the present material. It is very doubtful if the other differences between the two species, which I referred to in my earlier paper, can be regarded as of sufficient importance to be of specific rank. Unfortunately Dana's types are no longer available, and the point can never be satisfactorily cleared up. The areas of geographical distribution of the two species coincide, and there remains no legitimate reason for keeping them apart. I have, therefore, here taken the further step of uniting the two species under the earlier name of *P. orientalis*.

DISTRIBUTION.—East Indies (Hansen, 1910); between Ceylon and New Guinea (Zimmer, 1915); China Sea (Colosi, 1918 and 1920).

Genus *Pseudomysidetes*, nov.

DEFINITION.—Closely allied to *Mysidetes*, Holt and Tattersall. *Carapace* anteriorly broadly and evenly rounded, not produced into a rostral plate. *Eyes* large, cornea as large as the stalk, pigment black. *Antennules* with a prominent blunt spine on the outer margin of the first joint. *Antennal scale* broadly lanceolate, setose all round, with a distal transverse suture. *Maxillae* having the terminal joint of the palp powerfully and unusually armed, the proximal half of the inner margin with about fifteen short stout spines, the distal half with a row of five large triangular serrate spines and a single terminal simple spine. *Exopod* very small, with ten or eleven setae on the outer margin. *First thoracic limbs* (maxillipeds) very powerful, the lobe from the second joint unusually large, that from the third hardly perceptible, that from the fourth joint small but clearly developed; seventh joint short and expanded; apex armed with seven strong spines in addition to a few short, plumose setae. *Second thoracic limbs* (gnathopods) much more slender than the first, second joint broadly expanded, seventh joint terminating in two strong spines. *Third to the eighth thoracic limbs* showing a progressive reduction in the length of the endopod (third to seventh joints). In all, the second joint of the endopod is a large, broadly expanded plate. Sixth joint of the endopod divided into five sub-joints in the third limb, four in the fourth to the seventh, and three in the eighth. *Dactylus* simple in the third and fourth limbs, absent from the remainder. Male appendage on the eighth thoracic limb very long, and extending forward almost to the mouth. *Pleopods* of the male simple plates as in the female. *Telson* long and narrowly lanceolate in shape; apex entire, without cleft or plumose setae; distal portions of the lateral margins armed with a row of regular short spines; apex armed with a pair of longer spines between which is a pair of minute spinules.

TYPE-SPECIES.—*Pseudomysidetes russelli*, sp. nov.

REMARKS.—This remarkable genus comes nearest to the genus *Mysidetes*, with which it agrees in having the pleopods of both sexes alike, a series of simple plates, and in the great development of the male appendages of the last thoracic limbs and in the form of

the antennal scale. It differs from *Mysidetes* (1) in the quite unique armature of the distal joint of the palp of the maxillae; (2) in the peculiar form of the thoracic limbs showing a gradual reduction in the size of the endopod (third to seventh joints), until in the last limb the endopod, with the exception of the second joint, is a small slender appendage; (3) in the form of the telson, long and narrow, without apical cleft or plumose setae.

Pseudomysidetes russelli, sp. nov. (Text-figs. 6-8.)

OCCURRENCE.—Stn. 29, 24.xi.28, bottom stramin net. Twenty specimens, 14 males, 2 females and 4 immature specimens, 8-11 mm.

DESCRIPTION.—General form of the body robust. Carapace (Text-fig. 6a) rather strongly vaulted, broadly rounded in front and not produced into a rostral plate, leaving the eyes and eyestalks and the antennular peduncle completely uncovered.

Eyes (Text-fig. 6a) large, stalks rather short, and about equal in length to the large corneal portion of the eye.

Antennular peduncle (Text-fig. 6b) robust, first and third joints about equal in size, second joint much shorter; first joint with a prominent blunt spine on the outer margin.

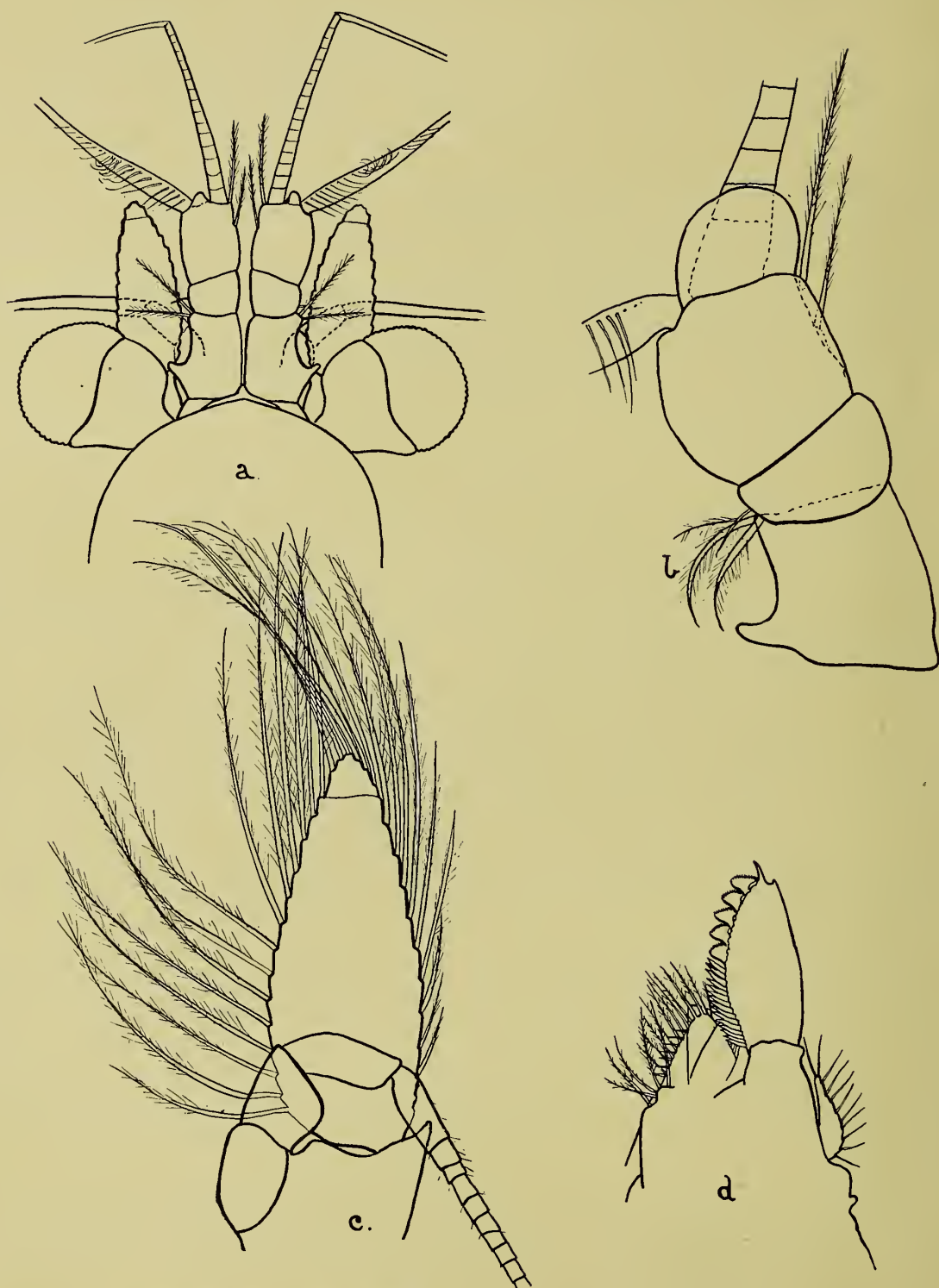
Antennal scale (Text-fig. 6c) short, extending forward to the level of the distal end of the antennular peduncle, two and two-thirds times as long as broad, with a small but distinct terminal joint marked off by a distinct suture, setose all round, the setae long and plumose; peduncle short, first two joints robust and subequal, third joint longer than the first and second, and much narrower.

Mouth-parts strongly built, but only the maxilla calls for any special comment. This appendage (Text-fig. 6d) is chiefly remarkable for the armature of the distal joint of the palp. The inner margin of this joint is armed proximally with about fifteen strong but simple spines very closely set, and distally by five very powerful triangular spines strongly serrated, and a distal simple spine. I know of no other Mysid in which the maxilla possesses anything like this peculiar and powerful armature. It serves at once to distinguish the species. The exopod is small and feebly developed, with about ten setae on the outer margin.

First thoracic limbs (maxillipeds) (Text-fig. 7e) robust and powerfully developed, gnathobasic endite of the second joint of the endopod very large and well developed, with a group of about a dozen long plumose setae and two short stout spines on the distal margin; gnathobasic endite almost absent from the third joint, but quite conspicuous on the fourth; terminal joint of the endopod short and broadly expanded, the distal margin armed with six or seven stout spines, one or two slender spines and a group of plumose setae; distal corners of the broadly expanded basal joint of the exopod rounded, without spines.

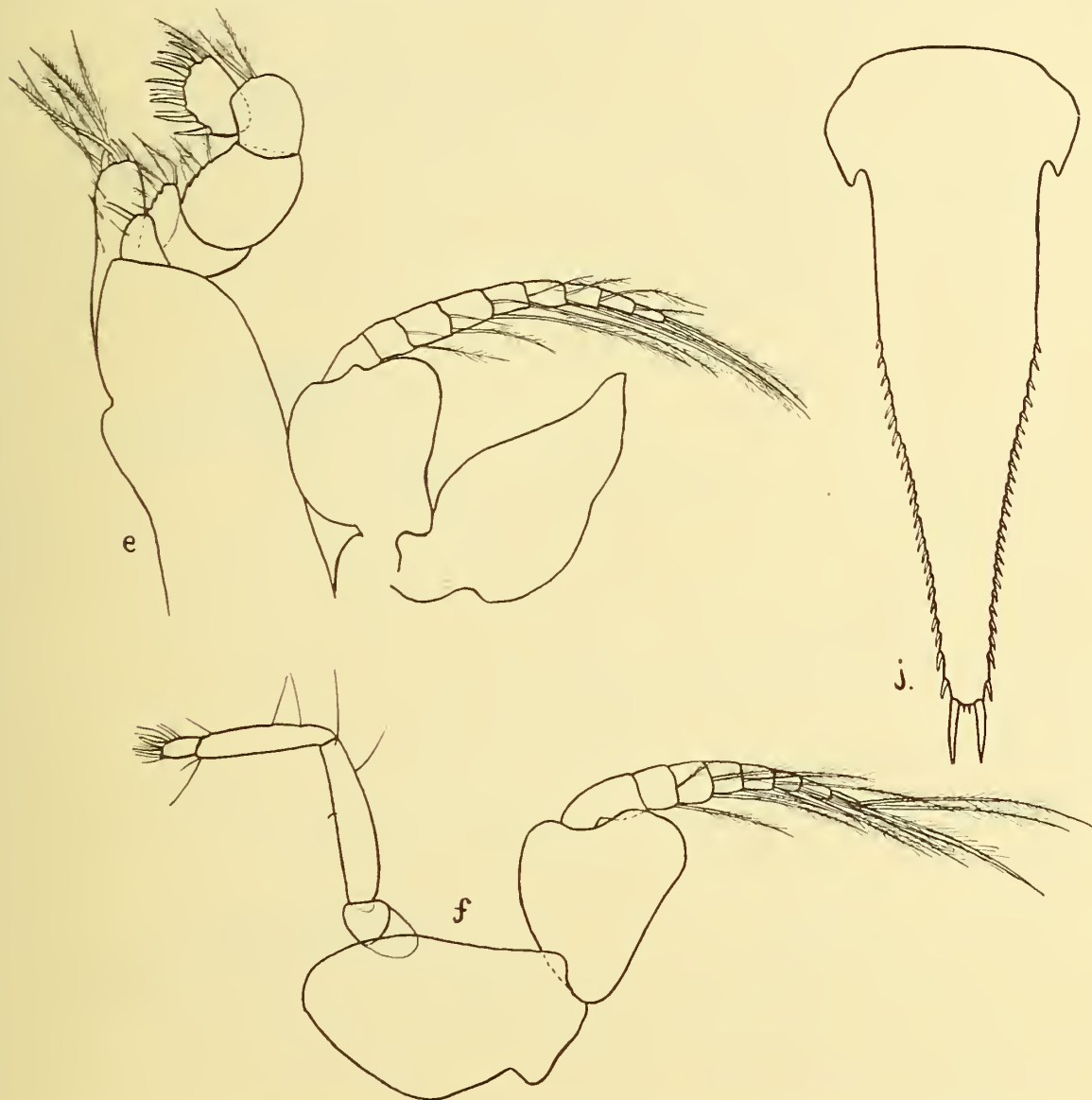
Second thoracic limbs (gnathopods) (Text-fig. 7f) with the endopod rather short and slender; second joint very large and expanded into a broad plate; third and fourth joints short; fifth joint elongate, a little longer than the sixth; seventh joint short, and terminating in two strong spines and a few simple setae.

Third and fourth thoracic limbs (Text-fig. 8g) very similar to one another; second joint of the endopod much expanded; long fine plumose setae on the margins of the fourth and fifth joints; sixth joint divided into five subjoints in the third limb and four in the fourth; seventh joint a simple dactylus.



TEXT-FIG. 6.—*Pseudomysidetes russelli*, gen. et sp. nov. *a*, Anterior end to show rostral plate, eye, antennular peduncle and scale, $\times 24$; *b*, antennular peduncle, $\times 56$; *c*, antennal scale and peduncle, $\times 56$; *d*, maxilla, $\times 56$.

Fifth to the eighth thoracic limbs (Text-figs. 8*h* and 8*i*) showing a progressive reduction in the size of the endopod; second joint of the endopod in all greatly expanded as a flat plate; sixth joint of the endopod divided into four subjoints in the fifth to the seventh limbs, with a gradual reduction of the fourth subjoint till in the eighth limb it disappears altogether, and the sixth joint of the endopod of this limb has only three subjoints;

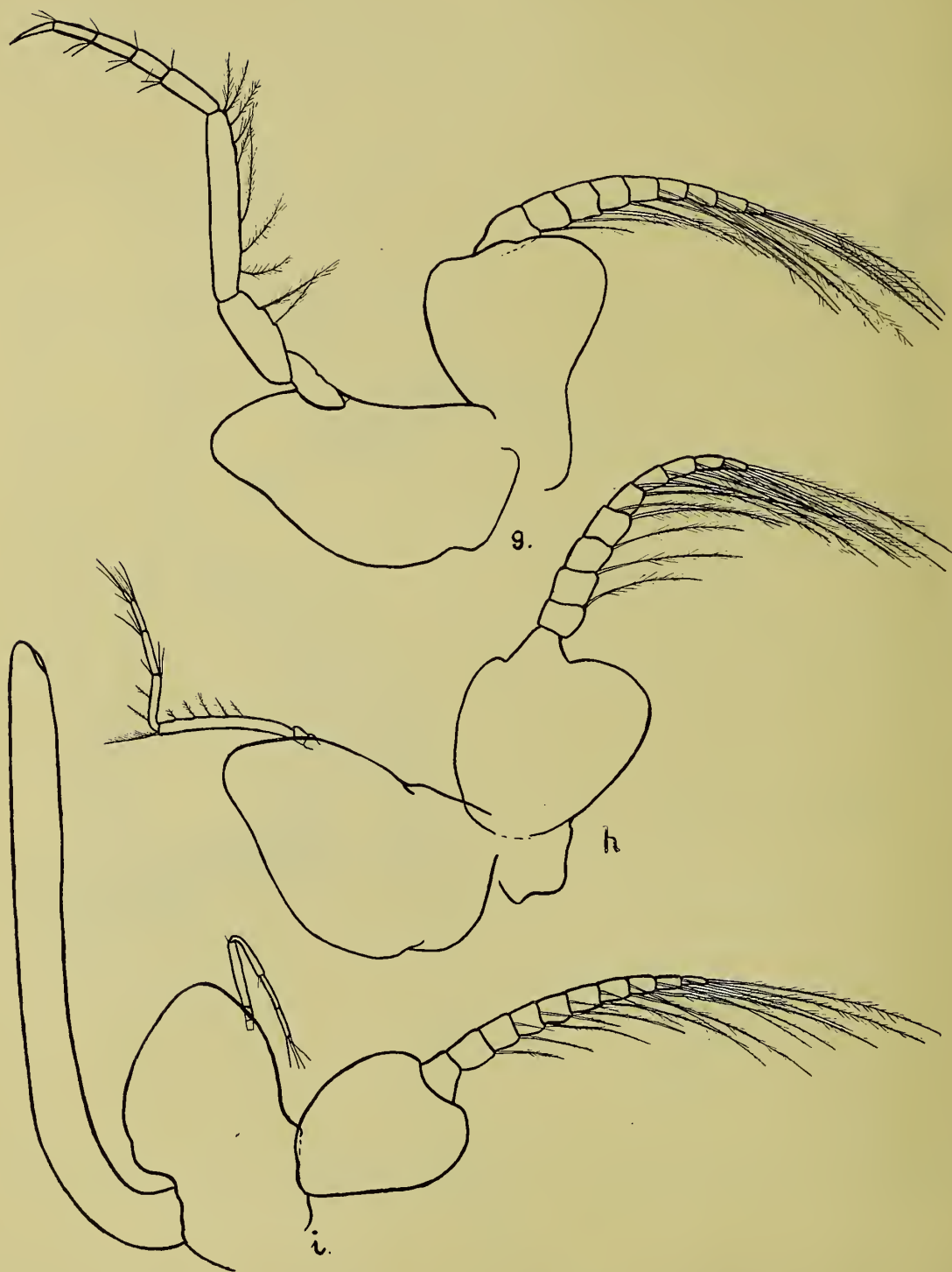


TEXT-FIG. 7.—*Pseudomysidetes russelli*, gen. et sp. nov. *e*, First thoracic limb, $\times 56$; *f*, second thoracic limb, $\times 45$; *j*, telson, $\times 56$.

dactylus absent in all. The male appendage of the eighth limb is very long and well developed, and extends forward almost as far as the mouth.

Pleopods in both sexes alike, consisting of small simple plates without sexual differences.

Telson (Text-fig. 7*j*) long and narrowly lanceolate in form, two and a half times as long as broad at the base; a short distance distal to the base there is a well-marked



TEXT-FIG. 8.—*Pseudomysidetes russelli*, gen. et sp. nov. *g*, Fourth thoracic limb, $\times 45$; *h*, fifth thoracic limb, $\times 45$; *i*, eighth thoracic limb, $\times 45$.

shoulder defined by a blunt process on each margin, behind which the telson suddenly narrows to a short truncate apex, which is entire and without apical cleft or plumose setae, equal in breadth to about one-twentieth of the length of the telson and armed by a pair of long, strong spines, one at each corner, between which is a pair of minute spinules; rather more than half of the lateral margins of the telson armed distally with a regular series of twenty-five short spines.

Uropods, inner, one and a half times as long as the telson, without spines on the inner margin; outer twice as long as the telson.

Length of an adult male, 11 mm., of an immature female, 8 mm.

REMARKS.—The combined characters of the antennal scale, telson, maxilla and the very peculiar condition of the thoracic limbs will serve to distinguish this species from any other described form. It is clearly a member of the Leptomysini, most closely allied to *Mysidetes* by the characters of the pleopods in both sexes and by the enormous development of the male appendage of the eighth thoracic limbs.

Tribe MYSINI.

Genus *Anisomysis*, Hansen.

Anisomysis laticauda, Hansen.

A. laticauda, Hansen, 1910.

A. laticauda, Zimmer, 1915.

OCCURRENCE.—Stn. 63, 3 mi. E. of Low Isles, 24.vi.29, coarse townet, 1 adult female, 4 mm.

Stn. 65, Barrier Reef Lagoon, 10.vii.29, coarse townet at 8 m. and at 15.5 m., 2 adult females, 4 mm.

DISTRIBUTION.—Hitherto known from 1 male specimen captured by the "Siboga" Expedition in the waters of the Dutch East Indies.

Anisomysis incisa, sp. nov. (Text-fig. 9.)

OCCURRENCE.—Low Isles Anchorage, 16.xi.28, coarse townet at 7.30 p.m., by moonlight, 8 adult males and 14 adult females, 4 mm.

Stn. 65, Barrier Reef Lagoon, 10.vii.29, coarse townet at 12.5 m., by night, 1 adult male.

DESCRIPTION.—*Carapace* covering the whole of the thorax, produced in front into a short, broadly rounded rostral plate.

Eyes large, pigment black.

Antennal scale (Text-fig. 9a) extending forward as far as the distal end of the antennular peduncle, seven times as long as broad, setose all round; terminal joint about one-sixth of the entire length of the scale.

Thoracic limbs.—The form of the endopod of the first and second thoracic limbs is shown in the accompanying figures (Text-figs. 9b, c). The sixth joint of the endopod of the third to the eighth thoracic limbs is undivided (Text-fig. 9d).



TEXT-FIG. 9.—*Anisomysis incisa*, sp. nov. *a*, Antennal scale and peduncle, $\times 134$; *b*, endopod of the first thoracic limb, $\times 244$; *c*, endopod of the second thoracic limb, $\times 244$; *d*, distal part of the endopod of the third thoracic limb, $\times 244$; *e*, telson, $\times 244$; *f*, fourth pleopod of the male, $\times 134$.

Sixth abdominal somite one and a half times as long as the fifth.

Telson (Text-fig. 9e) as long as the sixth somite of the abdomen, not quite twice as long as broad at the base; apex cleft for about one-quarter of the length of the telson, cleft unarmed; apical lobes of the telson armed with three subequal spines; distal half of the lateral margins armed with six or seven spines in addition to those of the apical lobes.

Uropods nearly twice as long as the telson and subequal to each other.

Fourth pleopod of the male (Text-fig. 9f) extending backwards to level of the apical lobes of the telson, distal peduncular joint twice as long as broad; exopod three-jointed, the proximal joint three times as long as the distal, which is slightly shorter than the second joint; third joint ending in two processes, one rather stout 2-jointed and fringed with setae on the distal part, the other more slender and spiniform.

Length of adult specimens of both sexes. 4 mm.

REMARKS.—This species is at once distinguished by the form of the telson with its rather deep unarmed apical cleft. It admits of no confusion with any other described species of the genus.

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EUPHAUSIACEA.

INTRODUCTION.

The collection of Euphausiacea made by the Great Barrier Reef Expedition is a small one, comprising sixteen species, fourteen of which are identified with existing species, and two represent larval forms which could not be referred to the adult stage. None of the species is new to science.

The area investigated by the Expedition has hitherto received very little attention apart from the corals themselves, and I am unaware of any collections of Euphausians from this locality. In this respect, therefore, the material, though somewhat scanty, fills in a gap in our knowledge of the geographical distribution of the species, and of the type of fauna of a hitherto unexamined region.

Twelve of the fourteen identified species were captured by the "Siboga" Expedition, which operated mainly in the waters of the Dutch East Indies, and the remaining two known forms are tropical species which might have been expected in the same area and actually occur in other parts of the Pacific. The Euphausian fauna of the Barrier Reef region is thus continuous with that of the sea immediately to the north of it—a typical tropical fauna.

All the species but one are oceanic forms, widely distributed in tropical waters. The exception, *Pseudeuphausia latifrons*, is a shallow-water coastal form, quite widely distributed in the Pacific, but always near to land and never under oceanic conditions. This species is the dominant one, in fact, the only form which is characteristic of the shallow lagoon area inside the reef. It occurred regularly throughout the year in the townettings at the weekly station. It also occurred in the hauls taken in the channels leading through the reef to the deep water beyond, but it was only taken twice in any of the gatherings made at stations outside the 100 fms. line.

The material yielded a fairly complete series of larval stages, which have enabled me to elucidate the life-history of the species. The life-history is closely parallel to that of *Nyctiphanes*, and suggests that the genus *Pseudeuphausia* is nearer to *Nyctiphanes* than to *Euphausia*, under which genus the species was first described.

From July to October, 1928, the lagoon was invaded by small numbers of oceanic species of Euphausians. Five such species occurred at the weekly station: *Thysanopoda tricuspidata* (eleven times), *Thysanopoda* sp. (larval stages, once), *Euphausia tenera* (seven times), *Nematoscelis microps* (once), and *Stylocheiron carinatum* (twice). These are oceanic forms characteristic of the upper 200 metres of water. No oceanic species occurred in the lagoon area from 22nd October, 1928, to the conclusion of the expedition in July, 1929. I am unable to offer any explanation of this curious fact. The remaining species of Euphausians were taken at those stations situated in the deep channels running in from openings in the reef, or in deep water outside the barrier.

In recording the larval forms of Euphausians I have used the nomenclature of Dr. Lebour (1926a) to indicate the stage of development reached by the Furcilia larvae. For instance, in recording Furcilia 10 under *Thysanopoda tricuspidata*, I mean to convey that the specimen in question has reached the stage of development of the pleopods corresponding

to Furcilia 10 of Lebour's nomenclature, namely, two setose and two non-setose pairs of pleopods. I do not intend to convey the meaning that the stage in question represents the tenth Furcilia stage of the species. I have used Lebour's nomenclature in this sense throughout this paper.

SYSTEMATIC ACCOUNT.

ORDER EUPHAUSIACEA.

Family EUPHAUSIIDAE.

Genus *Thysanopoda*, H. M.-Ed.

1. *Thysanopoda tricuspidata*, H. M.-Ed.

T. tricuspidata, Sars, 1885.

T. tricuspidata, Hansen, 1910.

T. tricuspidata, Hansen, 1912.

Cyrtopia rostrata, Dana, 1852.

OCCURRENCE :

Stn. 2, fine silk net .	1 Cyrtopia.	Stn. 14, coarse silk net .	1 Furcilia 14.
„ 3, coarse silk net .	3 Furcilia 12.	„ 15, „ „ „ .	1 post-larval.
1 m. stramin net	1 „ 14.		1 Cyrtopia.
„ 7, 1 m. „ „	1 post-larval.		1 Furcilia 1.
	2 Furcilia 14.	„ 18, coarse silk net .	1 „ 11.
„ 8, coarse silk net .	1 post-larval.		1 „ 12.
	1 Cyrtopia.		1 „ 13.
	1 Furcilia 1.	„ 19, 1 m. stramin net	1 Cyrtopia.
	1 „ 13.	1 m. silk net .	2 Furcilia 1.
„ 9, 1 m. stramin net	1 post-larval.	coarse net .	2 „ 1.
	1 Cyrtopia.		2 „ 3.
	1 Furcilia 14.		1 „ 8.
„ 10, coarse silk net .	1 „ 1.		3 „ 10.
„ 11, 1 m. stramin net	1 „ 14.		1 „ 14.
„ 12, 1 m. „ „	1 „ 10.	„ 20, coarse net .	1 „ 8.
„ 13, coarse silk net .	1 post-larval.	„ 21, 1 m. stramin net	1 „ 14.
	1 Furcilia 3.		
	1 „ 12		
	1 „ 13		

REMARKS.—Sars (1885) has given a good description of the general course of larval development in this species, and there are only a few points that can be added to his account. He described and figured two Furcilia larvae, Nos. 1 and 4 of Lebour's nomenclature. In the present collection I have found Furcilia Nos. 1, 3, 8, 10, 11, 12, 13 and 14, so that at least nine Furcilia stages are known, and probably eleven occur in all.

The development of the pleopods in the Furcilia stages follows that which Lebour (1925) has worked out for *Nyctiphanes* and *Meganyctiphanes*. A stage in which three

pairs of simple pleopods are present is followed by one in which the first pair are setose and the following three pairs simple. The second pair become setose before the fifth pair are developed. A strong lateral spine is present on the lower margin of the carapace in all the Furcilia stages. The dorsal spine of the carapace makes its appearance at the last Furcilia stage. The dorsal spines of the third to the sixth abdominal somites can be detected in the first Furcilia stage. The spine on the sixth is clearly present then. Those of the other three somites are seen as minute acuminations of the posterior margins. The spines become successively more clearly marked with each moult, and by the time the last Furcilia stage is reached the abdomen has assumed the character of the adult.

Sars (1885, pl. xxxi, figs. 17–22) gives a series of figures showing the changes in the telson from the early Furcilia to the post-larval stage. It will be noticed that seven terminal spines are present on the posterior apical portion of the telson through all the stages. The median one gradually elongates with the apex of the telson and becomes the median apical spine, but even in the post-larval stage three spines are present on each side of the apical one. This is rather different from what occurs in most other Euphausians. The spines in the apical portion of the telson usually disappear quite early, except the median one, which always appears to form the acute apex of the telson. The present material confirms Sars's observations on this point.

None of the specimens from the Barrier Reef is completely adult. The largest two still have the eyes in the post-larval condition with the prominent lateral protuberance, having seven corneal lenses, as figured by Sars (1885, pl. xxxi, fig. 10).

The specimens were all taken between the months of July and October, 1928, and I have seen no specimens from the townettings taken between October, 1928, and July, 1929. It would therefore appear that the breeding season for the species is in the early spring of the southern year. Against this must be quoted the statement of Hansen (1910), who, from an examination of the Siboga material, concluded that *T. tricuspidata* in East Indian waters bred all the year round. It is possible, of course, that larval and young stages of this species occurred outside the Barrier Reef at other times of the year, and that the presence of young stages in the reef lagoon was due to an incursion of oceanic forms into the lagoon area during the period July to October, 1928.

2. *Thysanopoda orientalis*, Hansen ?.

T. orientalis, Hansen, 1910.

OCCURRENCE.—Stn. 45, 1 m. stramin net, 1 young specimen, 15 m.

REMARKS.—The specimen is not fully grown, as shown by the rostral plate, which is produced in front into a sharp, well-marked spine of quite considerable length. This is characteristic of the young of certain species of *Thysanopoda* (e. g. *T. orientalis* and *T. monacantha*), and the spiniform apex shortens and almost disappears in the adult stage. Otherwise the specimen agrees very closely with Hansen's description and figures of *T. orientalis* and I refer it provisionally to that species.

3. *Thysanopoda*, sp. ?.

OCCURRENCE :

Stn. 12, 1 m. stramin net	. 1 Cyrtopia.	Stn. 20, coarse silk net, 1	. Furcilia 14.
„ 19, 1 m. silk net	. 1 Furcilia 10.	„ 28, 1 m. stramin net	. 1 late Cyrtopia.

REMARKS.—I cannot refer these specimens to their adult species. All of them have a very large spine on the carapace near the posterior end of the lower margin, a well-marked dorsal organ and the eyes small and divided into two portions. They are in all probability young stages of *T. orientalis*.

Genus *Euphausia*, Dana.

4. *Euphausia mutica*, Hansen.

E. mutica, Hansen, 1910.

OCCURRENCE.—Stn. 28, coarse net, 2 females and 1 male; 1 m. stramin net, 4 females and 2 males.

5. *Euphausia diomedeeae*, Ortmann.

E. diomedeeae, Ortmann, 1894.

E. diomedeeae, Hansen, 1910.

OCCURRENCE.—Stn. 28, coarse net, 1 female; 1 m. stramin net, 3 females and 1 male.

REMARKS.—All these specimens appear to be the normal type, and not the variety with the inflated rostral plate as described for Ortmann's types.

6. *Euphausia tenera*, Hansen.

E. tenera, Hansen, 1910.

OCCURRENCE :

Stn. 7, 1 m. stramin net .	3 adults.	Stn. 15, coarse net .	3 adults.
„ 8, 1 m. „ „ .	1 adult.	„ 16, II 10 m. .	3 „
coarse net .	1 Cyrtopia.	III 20 m. .	2 „
„ 9, „ „ .	1 adult.	IV 30 m. .	2 „
„ 10, 1 m. stramin net .	1 „	„ 19, coarse net .	1 Cyrtopia.
„ 13, 1 m. „ „ .	1 Cyrtopia.	1 m. silk net .	2 Furcilia 14.
coarse net .	4 adults and		1 „ 8.
	1 Cyrtopia.	„ 28, 1 m. stramin net .	4 adults.
„ 14, 1 m. stramin net .	2 adults.	coarse net .	1 adult.
„ 15, 1 m. „ „ .	1 adult.		

REMARKS.—This species is an oceanic form which lives in the upper waters and even at the surface. It invaded the waters inside the Barrier Reef in small numbers from August to October, 1928, but after that date no specimens occurred at the station near Low Island as long as weekly samples were taken.

7. *Euphausia pseudogibba*, Ortmann.

E. pseudogibba, Ortmann, 1893.

E. pseudogibba, Hansen, 1910.

OCCURRENCE.—Stn. 28, coarse silk net, 1 male and 1 female.

Stn. 45, 1 m. stramin net, 1 female.

8. *Euphausia sibogae*, Hansen.*E. sibogae*, Hansen, 1910.

OCCURRENCE.—Stn. 50, 1 m. stramin net, 400–0 m., 1 male and 1 female.

REMARKS.—These specimens differ from Hansen's description and figures in having the rostrum considerably longer. They are, however, not fully grown, and it is to this fact that I attribute the difference.

9. *Euphausia*, sp.

OCCURRENCE.—Stn. 20, coarse net, 1 Calyptopis 3; 2 Furcilia 9.

Stn. 45, 1 m. stramin net, 1 Furcilia 14.

REMARKS.—All these larvae, including the Calyptopis, have a lateral spine on the carapace. The Calyptopis closely resembles that described by Lebour (1926b) and Frost (1934), and attributed to *E. Krohnii*. It has a prominent, posterior dorsal spine on the carapace and the anterior edge of the carapace is serrate. The Furcilia 9 is a stage which Lebour believes to be characteristic of the genus *Euphausia*, with one pair of setose pleopods and four pairs of simple ones. The Furcilia 14 has five spines at the apex of the telson between the usual large pair. It is not possible to refer these specimens to their adult species. From their close similarity to the larvae of *E. Krohnii* it may be suggested that they belong to the same group, and probably to *E. mutica*.Genus *Pseudeuphausia*, Hansen.10. *Pseudeuphausia latifrons* (G. O. Sars).*Euphausia latifrons*, Sars, 1885.*Pseudeuphausia latifrons*, Hansen, 1910.

OCCURRENCE.—Weekly station at 3 mi. E. of Low Isles. Occurred at this station throughout the year and was captured on 34 occasions.

One mile N. of Low Island: Stn. 4, coarse silk closing net, 1 adult.

Reef Flat at high tide: 25.xi.28, 17 Calyptopis.

Other Stations.—Stn. 8, 45 m., 93 specimens, mainly Furcilia 13 and 14, and Cyrtopia.

Stn. 11, 61 m., 93 specimens from Calyptopis to adult.

Stn. 19, 225 m., 17 specimens, 10 adults and 7 Furcilia.

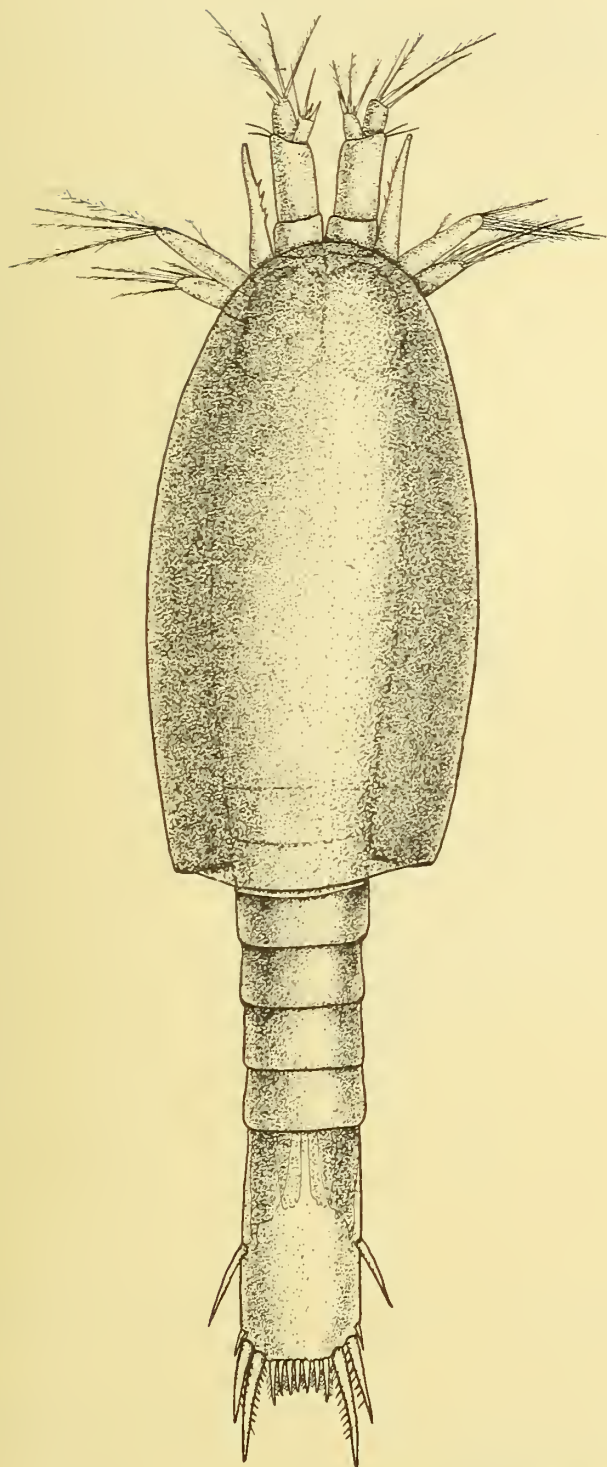
Stn. 26, 57 m., 2 adults and 1 Furcilia 2.

Off Cape Bedford.—Stn. 43, 30 m., 1 young specimen.*Inside Papuan Pass*.—Stn. 49, 46 m., 1 adult, 15 Cyrtopia and 1 Furcilia 14.*Outside Papuan Pass*.—Stn. 50, > 400, 1 m. stramin net, 170–0 m., 1 young specimen.

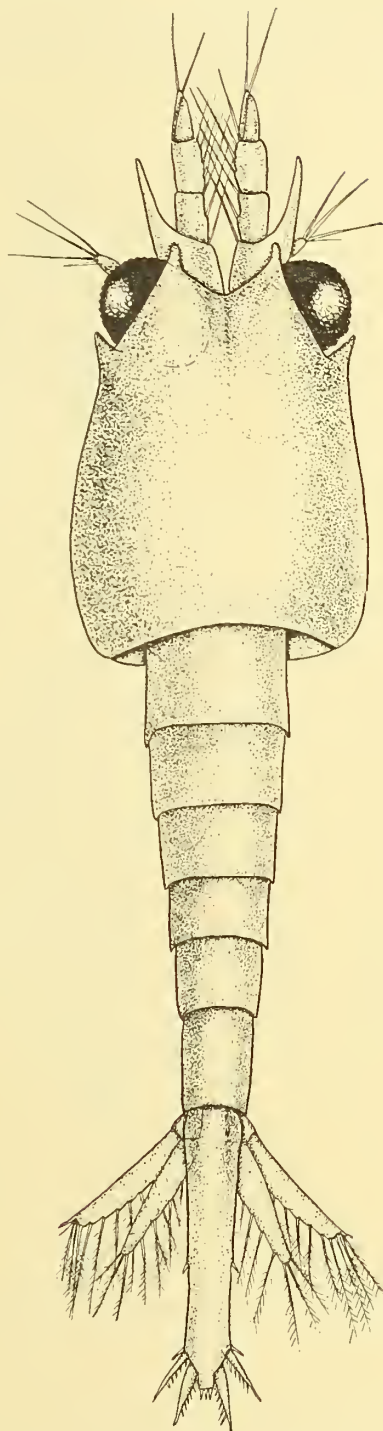
REMARKS.—This is the dominant species inside the Barrier Reef, and, indeed, may be said to be the only species which is a regular inhabitant of the lagoon area all the year. Such other Euphausians as were taken inside the Barrier are oceanic species which occurred very sparingly from July to October.

All stages in the development occurred from the first Calyptopis to the adult. The breeding season lasts from July to the end of November, with a maximum occurring in the first week of October. After the end of November only late Furcilia (stages 13 and 14), Cyrtopia and adults were found in the nets. On the other hand, ovigerous females occurred in November, 1928, and in March, 1929.

TEXT-FIG. 10.



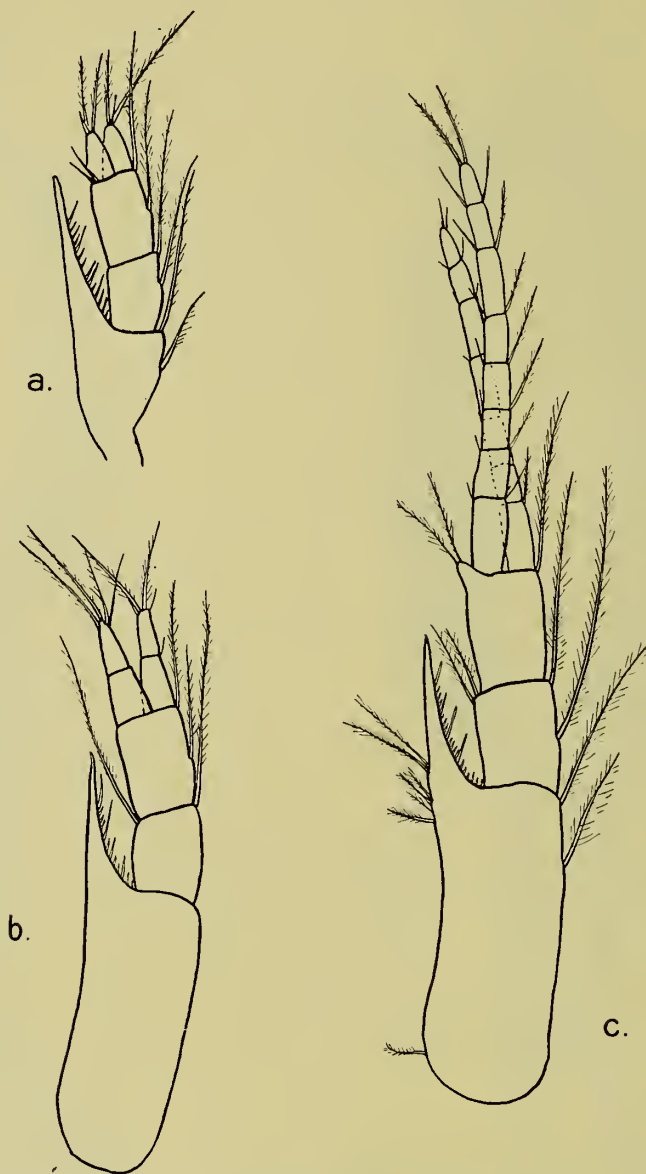
TEXT-FIG. 11.



TEXT-FIG. 10.—Third Calyptopis larva of *Pseudeuphausia latifrons* (G. O. Sars). $\times 120$.

TEXT-FIG. 11.—Furcilia 8 of *Pseudeuphausia latifrons* (G. O. Sars). $\times 60$.

Adult specimens agree with Hansen's re-description (1910) of this species in possessing a lateral denticle on the carapace, and in the form of the antennules. On the latter point Hansen confirms my earlier observations and figures of these appendages (1906). In one respect these specimens differ from Hansen's description and agree with that of Sars.



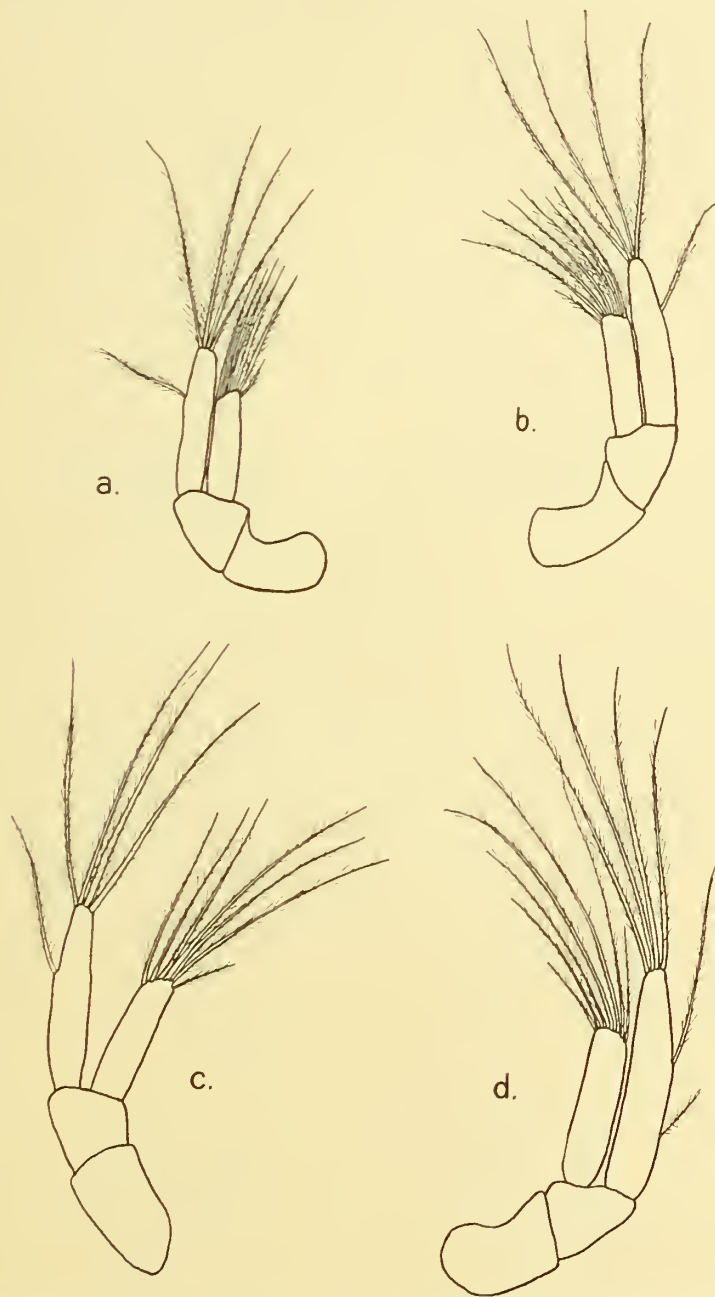
TEXT-FIG. 12.—Development of the antennules in the Furcilia larvæ of *Pseudeuphausia latifrons* (G. O. Sars). *a*, Furcilia 1; *b*, furcilia 4; *c*, furcilia 14. All $\times 120$.

They possess a short but distinct spine on the posterior median dorsal border of the sixth abdominal somite overhanging the base of the telson.

Hansen says "the abdomen without dorsal spines", thereby implying that this spine was not present in his specimens. Hansen has also described the ovisacs of the female. I can confirm his observations. The egg-sacs strongly recall those of *Nyctiphanes*, but appear to differ in that the distal anterior extremities of the ovisacs of each

side fuse, so that the sacs appear as a single sac with a rounded anterior end and a deeply divided posterior end.

Calyptopis larvae (Text-fig. 10).—Three Calyptopis stages were observed corresponding to the three stages regarded by Lebour as normal to all Euphausians. The Calyptopis

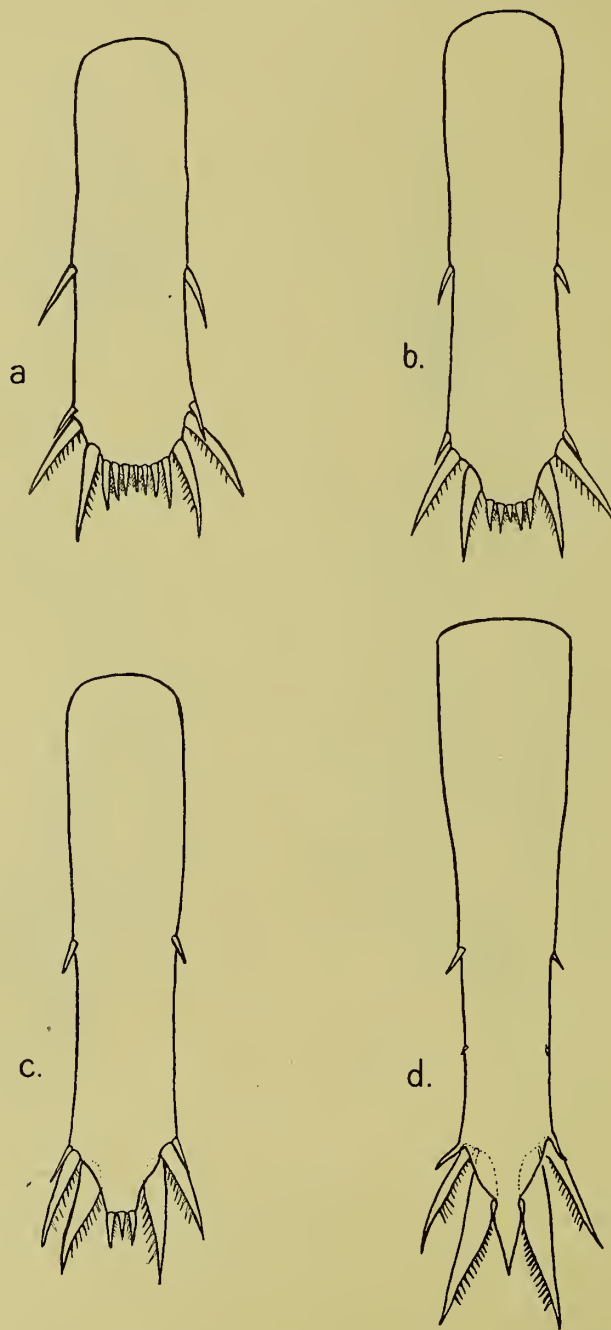


TEXT-FIG. 13.—Development of the antennæ in the Furcilia larvæ of *Pseudeuphausia latifrons* (G. O. Sars). *a*, Furcilia 1; *b*, furcilia 4; *c*, furcilia 8; *d*, furcilia 14. All $\times 120$.

larva has the carapace ovoid in shape, with an evenly-arched and perfectly smooth anterior margin, without any serrations. There is no posterior, median, dorsal spine on the carapace. In all the Calyptopis stages the lateral margin of the carapace is without a lateral denticle. The first Calyptopis stage has six spines at the apex of the telson between

the long terminal, lateral spines. The second and third stages have seven spines in this position.

The Calyptopis of *P. latifrons* is strongly reminiscent of the same stage in *Nyctiphanes* and *Meganyctiphanes*, especially in the robust form of the body, the smooth anterior



TEXT-FIG. 14.—Development of the telson in the Furcilia larvæ of *Pseudeuphausia latifrons* (G. O. Sars). *a*, Furcilia 1; *b*, furcilia 4; *c*, furcilia 8; *d*, furcilia 14. All $\times 120$.

margin of the carapace and the absence of a posterior dorsal spine. The Calyptopis stage of the genus *Euphausia* appears to show considerable variation. In the *E. Krohnii* group the front margin of the carapace is serrated and the posterior median dorsal margin is prolonged into a short spine. This spine is also present in the Calyptopis of

E. triacantha (Rustard, 1934), and is indicated at least in the third Calyptopis of *E. frigida* (Rustad, 1930), though neither of these species has a serrated anterior margin to the carapace.

Furcilia stages.—Using Lebour's scheme and numbering of the Furcilia stages (1926a, p. 523) the following Furcilia stages of *P. latifrons* have been found in the material from the Barrier Reef, having the development of the pleopods ascribed to these stages by Lebour—Nos. 1, 2, 3, 4, 8, 10, 12, 13 and 14. In addition there occurred a stage, which might be called 10a, in which there are three setose pairs of pleopods, one pair non-setose and the last pair as yet undeveloped. This stage appears to take the place of Lebour's stage 11 in the life-history of *P. latifrons*. In all there are thus ten Furcilia stages in this species.

A few Furcilia occurred which could not be placed in any of the above stages. There was one in which the pleopod formula was $S_1 N_1 0 0 0$, another with the formula $S_1 N_2 0 0$, and a third type with the formula $S_2 N_1 0 0$. These abnormal forms were very few. They all had three spines at the apex of the telson and I regard them as variations of Furcilia 8.

The general form of the Furcilia is shown in Text-fig. 11. Its most characteristic feature is the form of the rostral plate, deeply emarginate, with prominent lateral spines. The rostral plate has a distinct median depression, and the sides of the rostrum rise from this groove so that the emargination is angular in the centre. This is substantially the form of the rostral plate of the adult, the principal change being merely the gradual disappearance of the emargination so that in the adult the front edge of the plate is nearly or quite straight. The rostral plate serves to distinguish both the Furcilia and the Cyrtopia stages of *P. latifrons* from all other Euphausian larvae described hitherto. The carapace bears a small lateral denticle, which makes its appearance in the first Furcilia stage, and persists right through the larval stages to the adult condition.

The following table gives the size of the stages and the number of spines at the apex of the telson, between the large lateral spines, showing the gradual reduction in number from seven in the first stage to one in the last :

Stage.	Length in mm.	Spines at apex of telson.
1	2.0	7 (one or two with 5 spines).
2	2.2	5
3	2.4	5
4	2.4	5 (one with 7).
8	2.5	3
10	2.6	3
10a	2.8	3 (one with only 1).
12	2.8	1 (one with 3).
13	3.0	1
14	3.4	1

From this table it will be seen that there is a certain amount of individual variation in the number of spines on the apex of the telson. The telson develops quickly, and by the end of the Furcilia stages has assumed, practically, the adult form. A similar rapid development of the telson was found by Lebour (1926) to occur in *Thysanopoda aequalis*.

Cyrtopia stages.—These stages call for no special comment. They can be recognized at all stages by the form of the rostral plate.

The life-history of *P. latifrons*, as deduced from the larvae here described, is characterized by a prolonged larval life. No fewer than ten Furcilia stages were detected in the material. In contrast to this both Lebour (1926) and Frost (1934) have only been able to find three Furcilia stages in *Euphausia Krohnii*, corresponding to stages 2, 9 and 14 of Lebour's nomenclature. Frost suggests that deep-sea forms have abbreviated life-histories in which several Furcilia stages have been omitted. It is at least interesting that *Nyctiphanes* and *Pseudeuphausia*, both of which have apparently a prolonged larva life, are shallow-water genera.

The life-history of *P. latifrons* lends support to the separation of this species from the genus *Euphausia* which Hansen made on morphological grounds. In fact, the life-history seems to me to suggest that *Pseudeuphausia* is more nearly related to *Nyctiphanes* than to *Euphausia*.

Genus *Nematoscelis*, G. O. Sars.

11. *Nematoscelis microps*, G. O. Sars.

N. microps, G. O. Sars, 1885.

N. microps, Hansen, 1910.

OCCURRENCE :

Stn. 8, 1 m. stramin net .	1 specimen.	Stn. 19 (<i>cont.</i>), coarse net.	1 specimen.
coarse net .	2 specimens.	„ 20 „ „ .	1 „
„ 13, 1 m. stramin net .	1 specimen.	„ 28, 1 m. stramin net .	1 „
„ 19, 1 m. „ „ .	3 specimens.	„ 45, 1 m. „ „ .	1 „
1 m. silk net .	2 „		

REMARKS.—Of the specimens 8 are adult, 4 in the late *Cyrtopia* stage and 1 in the Furcilia stage 13. Only 1 specimen, that from Stn. 13, was taken inside the Reef. All the others were captured in oceanic waters on the edge of the Reef.

Genus *Stylocheiron*, G. O. Sars.

12. *Stylocheiron carinatum*, G. O. Sars.

S. carinatum, G. O. Sars, 1885.

S. carinatum, Hansen, 1910.

OCCURRENCE :

Stn. 12, coarse silk net .	1 adult.	Stn. 19, 40 m. (<i>cont.</i>) .	2 late Furcilia.
„ 16, 40 m. .	1 late Furcilia.		1 Furcilia 2.
„ 19, 40 m. .	6 adult.	„ 20, coarse net .	2 adults.
	7 <i>Cyrtopia</i> .		

REMARKS.—The first two occurrences are from within the Barrier Reef, and the other two from the oceanic waters at the edge of the Reef.

13. *Stylocheiron affine*, Hansen.*S. affine*, Hansen, 1910.

OCCURRENCE.—Stn. 20, coarse net, 1 ovigerous female carrying eggs, 1 Furcilia 4.

REMARKS.—The fourth Furcilia of this species differs from the ninth of *S. suhmi* in being larger in size, in having five cones in the distal part of the eye and in having seven spines on the apex of the telson.14. *Stylocheiron suhmi*, G. O. Sars.*S. suhmi*, Sars, 1885.*S. suhmi*, Hansen, 1912.

OCCURRENCE :

Stn. 19, 1 m. stramin net	5 specimens.		Stn. 28, coarse net	2 specimens.
„ 20, coarse net	4 „		„ 50, 1 m. stramin net	
			(170-0 m.)	2 „

REMARKS.—These specimens are mostly young adults. There is one Furcilia 9 which agrees with Lebour's description. It has 6 spines on the apex of the telson, and is shorter than the Furcilia 4 of *S. affine*. Of these specimens some have two and others have three cones in the distal portion of the eye.15. *Stylocheiron elongatum*, G. O. Sars.*S. elongatum*, Sars, 1885.

OCCURRENCE.—Stn. 50, 1 m. stramin net, 400-0 m., 1 adult.

16. *Stylocheiron abbreviatum*, G. O. Sars.*S. abbreviatum*, Sars, 1885.*S. abbreviatum*, Hansen, 1910.

OCCURRENCE.—Stn. 19, 1 m. silk net, 2 Furcilia 2, 1 Cyrtopia.

Stn. 20, coarse net, 1 Furcilia 14.

Stn. 50, 1 m. stramin net, 170-0 m., 1 adult.

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